RILSAN® FINE POWDERS BY ARKEMA

Dip coating in a fluidized bed of Rilsan® Fine Powders

PRINCIPLE OF THE PROCESS

Dip-coating in a fluidized bed consists in immersing a heated part in a powder bed maintained in suspension through rising air flow. As soon as the Rilsan® powder comes into contact with the preheated article, it melts and forms a film on the surface of the component. This process produces a consistent thickness, even on parts with complex profiles (internal and external coatings in one operation). The dip-coating process is efficient (very little powder wastage) and straightforward.

The Rilsan® T range has been developed specifically for this technology.

CRITERIA FOR CHOOSING THIS PROCESS

A desire to simplify the coating process will guide the customer toward the dip-coating technology, combining excellent productivity with perfect thickness control. Applying Rilsan® by dip-coating can easily be automated. The choice of this process depends on the following criteria:

Thickness of the part:

the process is particularly suitable for bulky or massive parts (metal thickness of at least 3 mm). For small diameter wire articles, a post fusion operation may be required following the dip-coating operation.

Thickness of coating:

the process allows the application of Rilsan® coatings with a thickness generally ranging from 250 to 500 µm. For very bulky parts, it is possible to apply thicker coatings by increasing dipping time, or by carrying out several consecutive dipping operations.

Size of the part:

the dimensions of the part determines the size of the tank. Very heavy or very long components (tubes) can be coated by this method, but will require specific handling equipment.

Nature of the support - surface treatment:

the process is suitable for any type of material that can withstand the necessary oven preheat temperatures. Massive parts will require a preheat temperature of around 300°C while thinner parts require preheat temperature up to 400°C.

OPERATING CONDITIONS

Surface treatment - Primer

The parts to be coated should be clean, and completely free of grease or oil. It is often necessary to apply a primer undercoat specifically compatible with Rilsan® dip-coating grades in applications requiring the most exacting performance, e.g. the transportation of drinking water, or in the automobile sector. The choice of primer depends on the nature of the material to be coated.

For further information, please refer to the Technical Datasheet on “Surface Treatments and Primers compatible with Rilsan® PA11 coatings”.

Type of equipment

• **Fluidizing tank:** preferably in stainless steel, it should consist of 2 parts separated by a porous plate made from polyester fabric. The air used for fluidization should be cold, clean and free of oil, and should be generated by an electric compressor in the case of large tanks. The temperature of the Rilsan® powder during fluidization should not exceed 60°C. Special fluid beds can be made that will keep the powder cool by circulating cold water through jacketed walls.

• **Environment and processing conditions:** an air exhaust should be installed near the top of the tank to capture dust particles that could contaminate the immediate environment (oven). Personal protective equipment such as a dust-mask is also recommended. The safety datasheet contains information on proper handling of the product.

• **Preheating oven:** a forced air circulation (6 m/s) oven is recommended. The oven should have a temperature controller and a vent with a fume extraction device. A batch oven (with one or more doors) or a tunnel type oven with component conveying may be used based on the type of work required.

Applying the coating

• **Preheating conditions:** to obtain a high quality Rilsan® coating over the entire surface, the temperature of the part should be as even as possible, around 280°C - 300°C at the time of dipping. The preheating temperature and time are determined respectively by the minimum and maximum thickness of the part to be coated. For example, the time needed to heat a 3mm thick steel plate up to 300°C is typically minimum 10 minutes.

• **Dipping:** the preheated part is dipped into the fluidized powder bed. Dipping time generally ranges from 3 to 5 seconds. To ensure good penetration of the powder, it is vital to move the part around during dipping to prevent the formation of coating defects.
Most parts should be allowed to air cool. However, thinner parts can be cooled by quenching in water after the coating is no longer molten.

• **Masking:** it is possible to locally mask areas that do not require coating by using wirewool for internal sections, and adhesive tape or a special paste for external sections.

• **Handling and touch-up of the parts**: the jig or hanger should be fastened to the part to allow good movements (shaking) of the part, for proper application of the coating. Where possible, it is preferable to attach the hanger to an area of the part that does not require coating. Hanger marks can be touched up with an epoxy or polyester resin.

RILSAN® T: MAIN APPLICATION DEFECTS AND THEIR POSSIBLE CAUSE

Nature	Cause
Poor adhesion	• Inadequate preparation of the surface • Too little or too much primer • Wrong preheating temperature and/or time
Bubbles	• Degassing of part • Primer coating too think • Air inclusion due to excessively long dipping time
Cluster	• Poor fluidization of the powder • Insufficient or inadequate motion during dipping
Black spots	• Contaminated powder • Presence of impurities around the tank • Pollution in post-fusion oven
Yellowing	• Preheating temperature too high • Preheating time too long • Dipping time too short
Pinholes at intersection of faces or wires	• Insufficient shaking during dipping • Preheating temperature too low • Dipping time too short
Poor edge coverage	• Preheating temperature too high • Dipping time too short • Post-fusion temperature too high • Post-fusion time too long
Frosting or unmelted powder	• Preheating temperature too low • Preheating time too short • Excessive delay between preheating and dipping • Dipping time too long • Insufficient shaking after dipping

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